APPENDIX I

SECTION 404 (b) (1) ANALYSIS

JACKSONVILLE HARBOR NAVIGATION (DEEPENING PROJECT)
DUVAL COUNTY, FLORIDA

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Section 404(b)(1) Evaluation
For the Jacksonville Harbor Deepening Project

1.0 Introduction

Section 404(b)(1) of the Clean Water Act (CWA) of 1972 requires that any proposed discharge of dredged or fill material into waters of the United States must be evaluated using the guidelines developed by the Administrator of the U.S. Environmental Protection Agency (EPA) in conjunction with the Secretary of the Army. These guidelines can be found in Title 40, Part 230 of the Code of Federal Regulations. The following evaluation is prepared in accordance with the guidelines and follows the recommended format contained in ER 1105-2-100, of December 28, 1990.

2.0 Project Description

The Jacksonville Harbor Deepening Project (proposed project) would deepen and widen the St. Johns River federal channel from river mile 0 to about river mile 13 and include dredging of channel and terminal turning basins for navigation and navigation safety. The USACE National Economic Development Plan (NED Plan) would provide a channel depth of 45 ft MLLW water with 2 ft of allowable overdraft. The locally (JAXPORT) proposed plan (LPP) would dredge to 47 ft + 2 ft of allowable overdredge depth. In addition, the USACE proposes some additional advance dredging at locations of known shoaling within the project footprint.

Dredging will occur primarily with the use of a hydraulic dredge. Some areas of the project template may require confined blasting to remove limestone rock. Confined blasting as approved for the Miami Harbor deepening project will provide the means of breaking up rock too hard for the use of cutter head dredges.

The USACE anticipates that the project will require up to five years of construction.

Disposal of dredged sediments may include two existing and one proposed Offshore Dredged Disposal Material Site (ODMDS), beach nourishment, nearshore disposal, disposal in one or more existing upland confined disposal facility (CDF), and beneficial use sites for shoreline hardening or other beneficial uses.

2.1 Project Location

Jacksonville Harbor is located within the St. Johns River, which spans 310 miles (mi) making it the longest river in Florida. The St. Johns River drainage basin encompasses over 8,840 square miles (sq. mi) spread across 16 counties. The lower St. Johns River (LSJR) is the estuarine portion of the river, formed at the confluence of the middle St. Johns River and the Ocklawaha River upstream of Palatka, FL. The local watersheds of the LSJR encompass about 2,755 sq. mi, about 32% of the total watershed area (SJRWMD 2012: Chapter 3 Watershed Hydrology). The main tributaries of the Lower

St. Johns River include Black Creek, Deep Creek, Sixmile Creek, Etoniah Creek, Julington Creek, McCullough Creek, Arlington River, Broward River, Dunns Creek, and Ortega River.

Along its path, the river's width varies dramatically. Within the project study area, the river is about 1,600 feet (ft) wide near its mouth on the Atlantic Ocean, 1,200 ft at downtown Jacksonville (Main Street Bridge), 16,000 ft at the Buckman Bridge, 12,000 ft near the Shands Bridge, and 3,500 ft at the US-17 Bridge in Palatka **(**DSEIS **Figure3**). At Palatka (DSEIS **Figure 4**: river mile 81) the river width generally decreases to about 2,000 ft and to about 700 ft at river mile 96, before expanding in width again at Lake George.

The St. Johns is a slow-moving river with a very mild slope averaging 0.1 foot drop per mile (ft/mi). DSEIS **Figure 5** provides estimates of the longitudinal river bed elevations. The mild slope of the river allows tidal effects to extend at least 106 river miles from the river mouth in Duval County to Lake George in Volusia County. Lake George, with an area of 67 sq. mi, is the second largest lake in Florida. The filling and draining of Lake George, due to subtidal variability of Atlantic Ocean water levels, causes intermittent periods of reverse flow extending far upstream in the Lower St. Johns River. These reverse flow periods, when the daily net discharge moves upstream, extend the upstream movement of salt as well as upstream dispersal of pollutants entering the river.

2.2 Authority and Purpose

The Jacksonville Harbor Deepening Study was authorized by a resolution from the Committee on Public Works and Transportation, U.S. House of Representatives, dated February 5, 1992, which states: "Resolved by the Committee on Public Works and Transportation of the United States House of Representatives, That the Board of Engineers for Rivers and Harbors, is requested to review the report of the Chief of Engineers on Jacksonville Harbor, Florida, published as House Document 214, Eighty-ninth Congress, First Session, and other pertinent reports, to determine whether modifications of the recommendations contained therein are advisable at the present time, in the interest of navigation and other purposes."

The U.S. Environmental Protection Agency (EPA) Region 4 proposes to designate an ocean dredged material disposal site (ODMDS) offshore of Jacksonville, Duval County, Florida (USEPA 2012). The purpose of the proposed action is to provide an economically and logistically feasible ocean disposal site for the long-term (50 years) management of suitable dredged material from the Duval County region in a manner that will not cause unreasonable degradation of the ocean with respect to the marine environment and human health. Dredge material is defined as "suitable" when it meets the criteria (40 Code of Federal Regulations [CFR] Parts 225 and 227), as determined by physical, chemical, and bioassay/bioaccumulation testing (USEPA and USACE 1991).

The existing Jacksonville ODMDS locates approximately 5 nautical miles (nmi) southeast of the mouth of the St. Johns River. However, due to capacity issues at this site, U.S. Army Corps of Engineers (USACE) Jacksonville District and EPA Region 4 have identified a need to designate a new ODMDS in the vicinity (USEPA 2012). The need for expanding current ocean disposal capacity is based on observed mounding, future capacity modeling, historical dredging volumes, and estimates of dredging volumes from future proposed projects. It is expected that the volume of dredge material generated over the next 50 years from the Jacksonville Harbor Navigation Project, Naval Station Mayport, and the proposed Jacksonville Harbor Deepening Project would exceed the combined capacity of the existing Jacksonville ODMDS, confined disposal facilities (CDFs), or beneficial use options, possibly as early as 2013.

3.0 General Description of Dredged or Fill Material and Quantity of Dredged Material

The composition of maintenance dredged material is expected to be similar to that previously deposited at the existing Jacksonville ODMDS (USEPA and USACE 2007). The existing Jacksonville ODMDS contains a mixture of silt, sand, and clay sediments as well as coarse material such as shell, gravel, and rock (USEPA and USACE 2007).

The sources of dredged material to be disposed in the new designated ODMDS are anticipated to be primarily from the Jacksonville Harbor Navigation Project and the Naval Station Mayport entrance channel and turning basin. The amount of and frequency of dredged material disposal is discussed in detail in USEPA (2012). Specific volumes will depend on the characteristics of the dredge materials (evaluated on a per-project basis), potential disposal restrictions in the site management plan, the amount that can potentially be used for beneficial use, and the amount that can be disposed in an upland facility. The method of dredged material disposal is expected to remain comparable to historical dredging operations, which have included a combination of mechanical and hydraulic dredging equipment. Clamshell and hopper dredges are typically used in the vicinity of Naval Station Mayport, and larger cutterhead equipment has also been used in the federal navigation channel.

3.1 Quantity of Dredged Materials

The proposed project will result in additional dredged disposal volumes that could range from approximately 7.6 to 31.5 million cy based on dredging to the 41-foot and up to the 50-foot project depth, respectively.

3.2 Sediment Characteristics

The new construction material generated from the proposed deepening of Jacksonville Harbor in all segments up to approximately river mile 13 will vary between silty sand, shell and shelly sand, some areas of silt and clay, as well as areas of limestone and sandy limestone. Upstream from the Mile Point area, scattered rock will be present at varying depths (USEPA 2012: **Figure 1.3-3**).

In general, the unconsolidated material becomes finer upstream, especially in the areas that have not been previously dredged (e.g. turning basins, wideners). Also, in general, the deeper the proposed project depths for this project, the more rock that will be encountered, with the exception of the area downstream of Mile Point.

The amount of material generated from the proposed deepening of Jacksonville Harbor will depend on the final project depth (between 41 and 50 feet) along each of the project reaches. Based on the study's preliminary dredging quantities (as of January 2012), the total amount of unconsolidated material (sand, silt, clay) generated from the deepening project could range from 7.6 million cy (based on a 41-foot project depth) up to 28.6 million cy (based on a 50-foot project depth). Of that material, approximately 0.6 to 2.9 million cy could be rock (USEPA 2012.) depending on the final dredging depth approved.

Not all of the rock material will likely be disposed of offshore in the ODMDS. It is anticipated that some of this material may be used for beneficial uses such as manufactured soil, artificial reefs, construction fill at Buck Island, filling deep holes at Mile Point, and nearshore beach placement (USACE and JAXPORT 2008).

The majority of the maintenance dredged material destined for disposal in the ODMDS is expected to be composed of silt (10% to 60%) and clay (10% to 30%) (USEPA and USACE 2007). Some of the rock or sand material may be suitable for beneficial uses; however, the material remaining after beneficial uses have occurred would require placement at an ODMDS due to lack of capacity at upland CDFs. In addition, there are also non-federal users such as the Jacksonville Port Authority (JAXPORT) that have future dredge material disposal needs. Some of the material dredged to maintain the entrance channel and certain reaches of the St. Johns River near Jacksonville are predominantly fine- to medium-grained sands of suitable quality for beach nourishment projects and are not disposed in the Jacksonville ODMDS.

3.3 Description of the Proposed Discharge Site

USEPA (2012) identifies the location of the Jacksonville Harbor ODMDS Preferred location as follows (pp. 43-44):

> Alternative 2 is the designation of a 4-nmi2 site approximately 1 nmi south of the southernmost boundary of the existing Jacksonville ODMDS (Figure 2.2-2). Boundary vertices coordinates are provided in Table 2.2-3. The center of the site is 7.4 nmi southeast of the mouth of the St. Johns River. Water depths at this site range from 44 to 64 feet MLLW, with an average depth of 55 feet MLLW.

Table 2.2-3 Alternative 2 Coordinates (NAD83) Vertices from USEPA (2012)

Vertices	Geographic Coordinates1		Geographic Coordinate- s2		Plane Coordinates3	
	Lat (N)	Long (W)	Lat (N)	Long (W)	x (northing)	y (easting)
Northwestern	30° 19.692’	81° 18.544’	30° 32820	81° 30906	558658.24	2179422.20
Northeastern	30° 19.697’	81° 16.062’	30° 32828	81° 26770	571707.38	2179419.13
Southeastern	30° 17.831’	81° 16.056’	30° 29719	81° 26761	571709.67	2168110.60
Southwestern	30° 17.826’	81° 18.536’	30° 29711	81° 30894	558665.25	2168113.98
Centroid	30° 18.762’	81° 17.300’	30° 31270	81° 28833	565185.14	2173766.53

[2] Decimal Degrees
[3] State Plane Florida (Feet)

With respect to mineral resources, this site is located immediately south of the Duval County sand borrow area (Figure 2.2-2). A small portion of the northern boundary of Alternative Site 2 abuts the southern boundary of the sand borrow area. The westernmost boundary of this site is approximately 1 nmi east of primary shrimp trawling areas that were identified by commercial shrimpers during the August 2010 scoping meeting. During the sidescan studies conducted in October 2009 and March 2010, some worm tube and mollusk aggregations were identified south of the site (Figure 2.2-2). Divers observed aggregations of transverse arks (*Anadara* southern boundary of Alternative 2. Aggregations of this bivalve species along with shingle tube worm (*Owenia fusiformis*) colonies and shell fragments were found in many areas of the three alternative sites based on results of faunal surveys (ANAMAR 2011). There is also 0.8 acres of hardbottom rubble within Alternative 2 boundaries. Additionally, a feature approximately 70 feet long was recorded on sidescan and is located approximately 1,360 feet south of the site. The structure appears to be a shipwreck based on recent (March 2010) high-resolution sidescan imagery. Two associated objects are visible in the high-resolution imagery that resembles outriggers or masts, one of which is completely separated from the hull and lies on the seafloor nearby. Maximum relief is unknown but appears to exceed 6.5 feet.

Other sites that may provide opportunities for disposal include the existing dredged material management areas (DMMA) at Bartram Island and Buck Island, the beaches just south of the river mouth and adjacent nearshore areas (for material with beach-suitable qualities) . DSEIS main text Figure 2.5 shows approximate locations of all potential disposal sites except for the Fernandina Beach ODMDS (Table 1) and potential beneficial use sites, which have not been identified.

Table 1 Fernandina Beach ODMDS Corner Coordinates Latitude (N) Longitude (W) (From USEPA 2012)

Latitude (N)	Longitude (W)
30° 33.00’	81° 16.86’
30° 31.00’	81° 16.86’
30° 31.00’	81° 19.13’
30° 33.00’	81° 19.13’

3.4 Description of the Disposal Method

Sediments dredged from the proposed Jacksonville Harbor deepening will vary between silty sand, shell, shelly sand, and rock. Hopper dredge, barge, and scow combinations are the usual vehicles of transport for the dredged material. None of the material is packaged in any manner.

The hopper dredge or other transport vessel will locate over the ODMDS site and release its load. Depending on the type of vessel and the material to be disposed, the material will either fall through opened doors in the hull of the vessel or be picked up from the hold and dropped into the water using a clamshell dredge or similar dredge tool.

Disposal of materials to the dredged material management facilities and the beach would most likely occur by pumping slurried sand to the desired location. At the DMMAs, the weir elevation would provide the means to allow the sand to settle out of the slurry water, which would flow over the weir and back into the river. Monitoring at the weir would ensure maintenance of state water quality standards for turbidity in the discharge water – not more than 29 Nephelometric Turbidity Units NTU) At the beach, standard beach construction methods and monitoring would ensure that the water effluent from the process met the same NTU criterion at the edge of a mixing zone defined by permit. The USACE concluded however, that disposing significant amounts of material on the beach was not feasible, considering the likely requirement to separate beach quality and non-beach quality sand before beach placement could occur (USEPA 2012a).

Nearshore disposal of sand would most likely occur by barge transporting sand to the site, and releasing it or slurrying and discharging the sand to the disposal site.

Beneficial uses would likely use bucket or clamshell dredge equipment to pick up material from a barge and place the material at desired locations.

3.5 Anticipated Schedule

The proposed project, if approved, will begin in approximately 2015 and require up to five years completing. This schedule is contingent upon agency review, and Congressional approval of proposed plans, and any necessary fiscal appropriations.

4.0 Factual Determinations

This section considers factors described in 40 CFR Part 230.11(a), 230.20 and applicable portions of Subpart H.

4.1 Physical Substrate Determinations

4.1.1 Substrate Elevation and Slope

Channel deepening will result in side slope cuts to achieve the authorized depth of the navigation channel, turning basins, and channel bend wideners where appropriate. Side slopes in the existing channel are expected to be modified as the deeper channel will require relocating the sideslopes landward to accommodate the same channel bottom width. No direct impacts of this widening are anticipated. The USACE anticipates that all material from the channel deepening dredging will be placed in the appropriate ODMDS or other approved location.

Within the ODMDS proposed for disposal of dredged material and in the general neighborhood of the existing and proposed ODMDS sites, the ocean floor generally conforms to the typical inner coastal shelf off northeast Florida: gently sloping to the east, low relief bottom with smooth surfaces exhibiting physiographic features contoured by erosional processes (USEPA 2012). A detailed description of surface site geology in the general location of the existing and proposed ODMDS is provided in USEPA 2012).

The Fernandina ODMDS has a depth range from -37 to -69 ft MLLW with an average depth of -53 ft. The Jacksonville ODMDS, currently receiving harbor channel maintenance dredge material, ranges in depth from -46 to -57 ft MLLW with a center elevation near the -30 ft MLLW elevation. The proposed ODMDS, south of the existing Jacksonville ODMDS has water depths between -44 and -46 ft MLLW, and lies about the same distance from the coast, 4.4 miles east.

4.1.2 Sediment Type

Sediment in the general area of the existing and proposed ODMDS is “predominantly silty sand and poorly graded sand (70% – 99% sand location dependent) (USEPA 2012).

The Jacksonville area beach and nearshore sediments generally conform to the “Florida State Sand Rule” (Florida Administrative Code Chapter 62B-41.007, Subsections 5(j)-5(k)) definition of beach compatible material. This is, predominantly carbonate, quartz, or other similar material with a particle size distribution ranging from 0.062 mm to 4.79 mm, must be similar in color and grain size distribution to existing material at the placement site, and must not contain any of the following:

- Greater than 5%, by weight, silt, clay, or colloids passing the #230 sieve;
- Greater than 5%, by weight, fine gravel retained on the #4 sieve;

- Coarse gravel, cobbles, or material retained on the ¾-inch sieve in a percentage or size greater than that of material on the native beach;
- Construction debris, toxic material, or other foreign matter; and
- Any materials or characteristics that would result in cementation on the beach

Material placed on the proposed beach and nearshore disposal location would have to meet those standards.

Material generated from the proposed deepening of Jacksonville Harbor in all segments up to approximately river mile 13 will vary between silty sand, shell and shelly sand, some areas of silt and clay, as well as areas of limestone and sandy limestone. Upstream from the Mile Point area, scattered rock will occurs at varying depths (USEPA 2012: Figure 1.3-3). In general, the unconsolidated material becomes finer upstream, especially in the areas that have not been previously dredged (e.g. turning basins, wideners). Also and in general, the deeper the proposed project depths for this project, the more rock that will be encountered, with the exception of the area downstream of Reach 4, where no rock is expected within any of the proposed depth alternatives.

The amount of material generated from the proposed deepening of Jacksonville Harbor will depend on the final project depth (between 41 and 50 feet) along each of the project reaches. Based on the study's preliminary dredging quantities (as of January 2012), the total amount of unconsolidated material (sand, silt, clay) generated from the deepening project could range from 7.6 million cy (based on a 41-foot project depth) up to 28.6 million cy (based on a 50-foot project depth). The total amount of rock generated could range from 60,000 cy (based on a 41-foot project depth) up to 2.9 million cy (based on a 50-foot project depth). Some of this material may provide for beneficial uses such as manufactured soil, artificial reefs, and construction fill at Buck Island, filling deep holes at Mile Point, and nearshore beach placement (USACE and JAXPORT 2008).

4.1.3 Dredged/Fill Material Movement

The dredged material will be discharged to the proposed ODMDS now under consideration for authorization. Although beneficial uses have been discussed (e.g. for rip-rap, beach nourishment, nearshore placement, artificial reef construction) at this time the USACE assumes that all the dredged material will be spoiled at the ODMDS proposed for project use. Should beneficial use ultimately be deemed viable for the dredged sediments, such fills will be configured in a manner consistent with the theoretical and predictive response of sediments to placement in the specific environment proposed for the beneficial use.

Material placed on the beach and nearshore would be subjected to transport by long shore currents that exist in the disposal location. Materials placed in upland disposal areas would not be subject to movement except by offloading to regenerate capacity in the CDF.

4.1.3.1 Physical Effects on Benthos

Dredging will impact benthos within the area of hydraulic dredge influence as the animals living in the sediments are suctioned into the dredge pipe and pump system. However, these species reproduce rapidly and adjacent, undisturbed sediments will supply a ready source of propagules to recolonize the remaining sediments. Where rock is removed for channel deepening, recolonization of the rock with algae and the small organisms (e.g. worms, clams, etc.) that live on the surface of and in the crevices of the rock will recover via mechanisms similar to the benthos living in unconsolidated sediments. Maintenance dredging may suppress recovery in certain areas that are prone to shoaling.

The benthos at the ODMDS site will be buried under the deposits of materials from channel dredging and subsequent maintenance activities. However, the same process of rapid recolonization from adjacent undisturbed habitat is expected to occur at the ODMDS site.

4.1.3.2 Physical Effects on Water Column Species

Water column species without sufficient speed to avoid the falling sediment and sediment plume may suffer clogged gills if swimming in the plume of the falling sediment, or burial if entrained in a column of falling sediment. The noise produced by the hopper dredge and attending vessels may cause some species to avoid the general area.

4.1.3.3 Physical Effects on Beach Habitats

Animals living within the intertidal and supratidal beach will experience burial if beach disposal is used. The beaches proposed for sand placement provide nesting habitat for endangered marine turtles; therefore, appropriate protective measures shall be implemented.

Beach and nearshore sand placement would have similar effects on the benthos (i.e. burial) as would ODMDS disposal. The beach and nearshore environment is more physically dynamic than the ODMDS environment, with resident species selected for their ability to reproduce rapidly as a response to the harsh environment.

4.1.3.4 Actions Taken to Minimize Impacts

As indicated above, materials placed on the beach or nearshore areas would have to comply with the Florida Sand Rule. Further, beach and nearshore placement would be performed in accordance with applicable federal biological opinions and the state permit in order to minimize potential impacts to swimming and nesting turtles and turtle nests. Observers aboard the dredge and material transport vessels would help spot and as necessary avoid impacts to turtles, marine mammals, or other listed or managed

species, in particular by waiting to release sediments until the located animals have left the area.

Turbidity plumes from materials placed in a DMMA can be controlled by monitoring and (2) raising the height of the weir to increase settling time and maintain acceptable turbidity levels and (2) temporarily close the weir and cease dredging if discharge waters exceeds permit criteria and other options have failed to maintain the permit-required water quality. Similarly, at the ODMDS monitoring of any turbidity plume and cessation of activities if the plume turbidity levels exceed the permitted levels (typically 29 NTU above background) will minimize the impacts of these activities.

5.0 Water Circulation, Fluctuation, and Salinity Determinations

This section considers factors described in 40 CFR Part 230.11(a), 230.20 and applicable portions of Subpart H related to the proposed discharge of dredged sediments.

5.1 Water

Project dredging and disposal activities would be performed in compliance with State of Florida water quality standards. In accordance with the Coastal Zone Management Act, a Federal Consistency Determination (CD) has been prepared for the proposed ODMDS placement and that CD will be reviewed by the State for their concurrence that the project is consistent with the enforceable policies of the Florida Coastal Management Program. State consistency review will be performed as part of stakeholder and agency coordination of the draft EIS. The USACE expects that the State of Florida will concur with the determination that the project is consistent with the enforceable policies of the Florida Coast Management Program.

5.1.1 Salinity

The proposed project will dredge material from the most saline portion of the Jacksonville federal navigation channel and dispose of that material in an ODMDS in the Atlantic Ocean offshore of the project location, on an Atlantic Coast beach or nearshore area, or in upland dredged material management areas. The dredging locations may reach near marine salinities, but may also be diluted by upstream flows and fall to levels of 10 ppt or less. However, this should not result in any impacts at the various disposal areas. Material dredged during periods of low salinity and discharged to the ODMDS will have insufficient volume to result in any significant change in the salinity of the waters above the ODMDS, on the beach or in the nearshore. No measurable alteration of the salinity regime at or near the ODMDS, the area that will likely receive the large majority of the project dredged material, is anticipated in conjunction with the dredging and spoiling operations.

Areas in the river upstream of the dredging to approximately Green Cove Springs may experience increased level and duration of salinities as a result of channel dredging alternatives (Taylor 2011, 2013c).

5.1.2.1 Clarity/Color/Odor/Taste/Nutrients/Eutrophication

The alternative project sediment disposal areas do not include any fresh water sites or freshwater source sites that disposal would impact. The dredging activities will likely produce temporary turbidity that will remain with the state water quality certification requirements. Ongoing LSJR federal channel maintenance dredging projects removing up to and more than 1 million cy/yr have not resulted in significant turbidity exceedences. Because the sediments are primarily sand and clay with some rock, the USACE does not anticipate addition of greater turbidity levels or increases in water column nutrient concentrations during the dredging or as a result of ODMDS disposal or other means of dredged material disposal.

While dredging will temporarily disturb the sediments, the sediments do not likely carry sufficient nutrients to stimulate eutrophication or cause algal blooms. The water circulation is dominated by the tides of the Atlantic Ocean and water residence times remain low under most conditions.

5.2 Current Flow and Water Circulation

Project disposal area waves are predominately out of the east and a few exceed 2 meters (6.6 feet) in height or 15 seconds (s) in period (USEPA 2009). Waves are the primary factor influencing re-suspension of disposed dredged material, and currents probably affect the direction and magnitude of transport (USEPA 2009). Currents flow predominately in a north-northwest and south-southeast direction and rarely exceeds 30 cm/s in magnitude (USEPA 2009). Surface currents are stronger than near-bottom currents. The net direction of transport is to the southeast with surface currents having a stronger southerly component (USEPA 2009). Dilution rates are expected to range from 140:1 to 2800:1 after four hours (USACE 2010).

Placement of materials at ODMDS sites will not likely affect general current flow and water circulation in the area, as these currents are the result of much larger processes occurring within the regional ocean. Placement of material along the beaches and nearshore bottom occurs in the same general oceanic environment. Placement will not appreciably alter current flow or circulation.

5.2.1 Stratification and Salinity

Placement of dredged material at any of the proposed alternative locations would not materially influence stratification conditions or salinity in the placement area or beyond. The channel in the proposed dredging area is relatively deep (30-40 ft), narrow (less than a mile wide) and strongly influenced by marine tides. Higher salinities found at the lower elevations project construction area express this influence most completely.. The

alternative dredge disposal sites are all well within the influence of marine waters. Discharge from the CDF would have the greatest potential to change salinities near the CDF outfall, but only locally and when upstream discharges are high enough to lower salinities in the river surface waters at the discharge point. Mixing would rapidly reduce and eliminate any salinity gradient that developed at the point of discharge.

5.2.2 Hydrologic Regime

The proposed sediment discharges will have minimal to no impact on the hydrologic regime of surface and groundwater in the project area. The flows from the CDF (as the sediments dewater) are very small compared to the flow of the river where the discharges occur. The CDFs are the sites with the greatest potential to influence groundwater flow and quality. These sites are in the middle of the river within the project construction area and have been used as disposal sites for channel maintenance and deepening activities for decades. Thus any potential effects have likely already occurred. The proposed use of CDF for additional materials will not alter the conditions developed over the lifespan of the CDFs.

5.2.3 Normal Water Level Fluctuations

The use of the ODMDS to dispose of materials dredged during construction and long-term maintenance activities will likewise not affect water levels or waves in the Atlantic Ocean or along the shoreline of Jacksonville / Duval County adjacent to the ODMDS site.

Within the dredged channel and upstream, tidal ranges may increase slightly (up to 0.4 ft) depending on the alternative selected and location examined (DSEIS main text Table 7.3). Dredging alternatives likely will not affect water levels upstream of Buckman Bridge for 2018 scenarios (post construction conditions).

5.2.4 Salinity Gradients

Salinity gradients in the river main channel will move slightly upstream (Taylor 2011, 2012a, 2013c) in response to channel deepening alternatives. Increased salinity levels within the main stem of the St. Johns River that might result in significant effects on biota in the main stem would occur from approximately the Dames Point Bridge (river mile [rm] 11) to at least the Shands Bridge (approximately river mile 50) as well as a portion of the Ortega River. Downstream of river mile 11 the river salinities approach that of the nearshore Atlantic Ocean. Discharges of sediment at any of the alternative locations are of insufficient magnitude (compared to the water bodies in which they are placed, or into which the CDF discharges) to create any more than very local effects. Depending on riverine salinity, sediment-water might be considerably lower than that of the ocean and local, temporary gradients could develop at the ODMDS location or locations used for disposal. These gradients would disperse over time with diffusion of the fresher water out and saline water into the deposited sediments.

5.3 Actions That Will Be Taken to Minimize Impacts

Disposal of dredged sediments will have only very localized effects on water circulation, fluctuation, and salinity. If temporary actions are necessary to minimize changes to salinity in the location of CDF discharges, the water could be held in the CDF until the salinity of the river returns to a level closer to that of the discharges. However, the discharge of the CDF is so small compared to the river discharge that such discharges would likely only affect a very small area. For the other alternative disposal sites, material disposal will follow all applicable rules and regulations associated with the disposal location and particular sediment qualities.

6.0 SUSPENDED PARTICULATE/TURBIDITY DETERMINATIONS

Guidance for this section of the 404(b)(1) evaluation is furnished in Title 40 CFR 230.11(c) and 230.21.

6.1 Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Dredging and Disposal Site

Turbidity plumes generated by regular channel maintenance activities in the proposed project footprint remain within permit-required turbidity levels. The dredging and dredged material management associated with the deepening project will be conducted to remain within the requirements of environmental permit conditions for that project. Permit conditions are expected to include monitoring of any plume produced by the dredging and disposal of dredged materials with actions required if the plume exceeds the marine turbidity standard, 29 NTU above background in most locations. For the area adjacent to the Timucuan Ecological and Historic Preserve, the USACE and other federal agencies are coordinating to develop an appropriate turbidity standard, monitoring, and action plan for exceedences. Those plans will become part of required conditions for conduct of the project.

6.2.3 Contaminants

USEPA (2012) describes types, quantities, and chemical characteristics of sediments proposed for dredging and disposal in ODMDS sites. Dredged material is not generically considered as either a "hazardous substance" under the definitions of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 U.S.C. 9601(14)) or a "hazardous waste" under the definitions of the Resource Conservation and Recovery Act (RCRA) (42 U.S.C. 6921 et seq.). Some industries do transport goods through the Harbor that could be considered hazardous or toxic. The U.S. Coast Guard establishes procedures for such movement to ensure those operations are done safely. No such movements have resulted in spills that caused widespread threats to human health or safety.

USEPA (2012a) provided modeling using STFATE model of dredged material disposal in open water to evaluated dissolved contaminant concentrations in the water column resulting from the disposal of dredged sediment from barges and hopper dredges.

The model can determine the potential for water column impacts by comparison of predicted dissolved contaminant concentrations, as determined by an elutriate test, with the applicable water quality standards, considering the effects of mixing with ambient waters. The results of STFATE simulations are the maximum dissolved concentration of a contaminant within a defined mixing zone over a 4-hour period. This concentration is compared to the water quality standard to determine if the discharge complies with water quality guidelines.

In general, the range of dilution factors for maintenance dredged material would be expected to be similar for the alternative sites based on the similarity in water depths, current velocities, and sediment physical characteristics of dredged material. Sediment physical characteristics, disposal volumes, and the dredging technique affect the amount of dilution. Based on previous evaluations of dredged material disposal at the existing Jacksonville ODMDS, dilution rates can range from 140 to 2760 after 4 hours (USACE 2010c).

Sediment characteristics from material historically dredged from Naval Station Mayport and the Jacksonville Harbor Navigation Project has been disposed of offshore since the 1970s and earlier. Tier III analyses and evaluation have been performed previously on material originating from these areas to evaluate the impact of disposal of dredge material from these sites. Tier III tests include (1) determination of water column toxicity and (2) assessment of toxicity and bioaccumulation from the material to be dredged. These tests indicate that no long-term impacts to water quality have been documented (USEPA 2012a).

Water column chemistry at ODMDS sites has typically shown little or no impact due to dredged material disposal in past studies. Results from status and trends assessments conducted by EPA Region 4 at the existing Jacksonville ODMDS show little or no changes spatially in the chemical constituents in the water column proximate to the other stations (USEPA 2010). Previous surveys of the Fernandina Beach ODMDS indicate the water column is well mixed with no elevations in chemical concentrations and no indication of low dissolved oxygen (USEPA 2006).

Based on previous survey results from the two OMDMSs in the region, disposal operations at the proposed alternative sites should not cause significant effects on concentrations of contaminants in the water column given that only dredge material of suitable quality will be permitted for disposal.

6.2.4 Pathogens

Since effluent originates from the St River and no biological organisms are added during the dredging operation, no new pathogens are expected as a result of the dredging.

6.2.5 Aesthetics

Some visual impacts from turbidity are expected from the open water discharges. However, there are expected to be temporary in nature, and diluted by river and ocean currents. Weir releases may also have some visual impacts, but such impacts are expected to be local and not as severe as experienced during a heavy rain event.

6.2.6 Effects on Biota

Suspended particulates may be expected to have some adverse impact on filter feeders, but those impacts are expected to be temporary. Open water disposal would occur regularly, but for relatively short periods of time and would be subject to mixing. To minimize any impacts in this area it the USACE will, to the extent possible, no nearshore open water disposal operations would take place during biologically critical reproductive season for area reduce impacts to fish, endangered species, birds and benthic communities, the District would follow the recommendations of the USFWS and NMFS, now under development through formal coordination, concerning the timing of disposal operations on the beach, nearshore, and ODMDS sites.

6.2.7 Primary Production, Photosynthesis

Suspended particulates may be expected to have some adverse impact a negligible effect on primary production because the occurrence of turbidity is localized and temporary. Studies performed by Dr. D. F. Hayes in 1986 on a hydraulic cutterhead dredge operating in Savannah Harbor indicated that average suspended sediment concentrations within 1,600 feet of the dredge were generally raised less than 200 mg/L in the lower water column and less than 100 mg/L and 50 mg/L in the middle and upper water column, respectively. Savannah River has a naturally high suspended sediment load, which during storm events is expected to increase well beyond the 200 mg/L increase created by a hydraulic dredge. Also during storm events, the higher suspended sediment loads would likely be more uniform throughout the water column due to mixing as the plume proceeds downstream. Based on these considerations it no change to overall productivity of the estuary, the river or coastal waters is expected.

6.2.8 Suspension/Filter Feeders

Suspended particulates may be expected to have some adverse impact on filter feeders, but these impacts will be localized and temporary.

6.3 Actions taken to Minimize Impacts

The deepening project will likely require a new ODMDS site with sufficient capacity for continuing normal dredging maintenance and channel deepening materials. Where and when possible and appropriate, materials may also be disposed in existing sites. Turbidity monitoring will occur during disposal activities at any ODMDS site used for the

project, and the disposal activities will adhere to permit required monitoring protocols and actions in the case of turbidity exceedence.

Other actions to avoid and minimize impacts associated with turbidity could include timing of open water discharges to include months of lowest impact to fishery resources and to minimize activities during right whale calving season (November 15 – April 15).

Disposal to beaches would follow practices required by permits for the activity, which will likely include management activities to reduce turbidity of materials discharged to not more than 29 NTU at the edge of a defined mixing zone.

7.1 Ecosystem and Organism Determinations

7.1.1 Effects on Benthos

Disposal of dredged materials will result in temporary disruption in benthic communities. However, recolonization occurs relatively rapidly. There will be a temporary impact on benthic communities at the open water disposal sites as some organisms will be lost by the covering. Some organisms, which inhabit the underwater sites, are capable of moving of upward burrowing and should survive. Benthic organisms at the nearshore and proposed beach disposal sites are typically subject to changes associated with the daily shifts in their habitat substrate. In addition, these organisms commonly recolonize nourished beaches. Turbidity effects may be produced by unconfined nearshore disposal, but they are expected to be temporary and minor.

7.1.2 Effects on Plankton and Nekton

Impacts from open water discharges would be primarily due to increases in turbidity during dredging and sediment disposal operations. Increased turbidity could include a decrease in phytoplankton growth from decreased light availability due to absorption or reflection of light by suspended particulates. A decrease in feeding by nekton could result from reduced phytoplankton availability, limited visibility of prey or interference in feeding behavior from increased particulates. These temporary impacts are not expected to result in significant impacts on plankton or nekton.

7.1.3 Effects on Aquatic Food Web

Aside from temporary and localized effects of turbidity, no appreciable effects on the aquatic food web are anticipated. As stated previously, coordination with other federal agencies will identify means to minimize impacts to aquatic resources by such actions as minimizing, restricting, or halting open water disposal operations during biologically periods as well as other more standard actions such as devoted observers for listed species, turbidity monitoring, monitoring, and boat operation restrictions.

7.1.4 Effects on Special Aquatic Sites

The Timucuan Ecological and Historic Preserve, a 45,000-acre complex of estuarine wetland, open waters, and uplands at the mouth of the St. Johns River and Nassau River, lies along a portion of the channel proposed for deepening. In-water disposal of dredged sediments at identified alternative locations are far removed from the Preserve boundaries.

7.1.5 Sanctuaries and Refuges

The dredging project area (including dredging template, potential disposal areas, and potential effects area) does not include any Sanctuaries or Refuges.

7.1.6 Submerged Aquatic Vegetation and Wetlands

Identified sediment disposal locations (CDF, beach, nearshore, and ODMDS sites) do not include SAV (sites are too saline) or wetlands (sites are too deep).

7.1.7 Threatened and Endangered Species

A number of listed species may be found in the affected area. In or near the affected area are critical habitat for wintering Piping Plover, Important Manatee Habitat as well as critical habitat for manatees, critical habitat for wintering/calving Right Whale, nesting and foraging habitat for sea turtles, potential habitat for the shortnose sturgeon and small tooth sawfish, foraging habitat for Wood Stork, resting/foraging habitat for the Red Knot, and habitat for the Gopher Tortoise.

A Biological Assessment of Threatened and Endangered Species (BA) has been prepared for the deepening and widening of portions of Jacksonville Harbor and continued operation and maintenance of the Jacksonville Harbor Navigation Project The BA concluded that the proposed project may affect Right Whales and Sea Turtles (in the water and on the beach). The BA also stated that the proposed action may affect but is not likely to adversely affect the manatee, wood stork, shortnose sturgeon, smalltooth sawfish, piping plover, and red knot. Listed bird species may use the CDFs and beaches proposed for sediment disposal. Gopher Tortoises may colonize the CDF during periods between CDF uses.

7.1.8 Other Wildlife

The USACE will as appropriate and necessary propose and coordinate to develop specific mitigation plans for potential salinity-induced impacts to SAV, wetlands, benthic macroinvertebrates, and fisheries associated with the proposed deepening.

7.2 Actions to Minimize Impacts

To ensure that dredging operations are not likely to adversely impact sea turtles, all dredging operations would be done in compliance with the appropriate Biological Opinion for navigation channels and hopper dredge operations in the southeast issued

by the NMFS. The proposed action would follow the terms and conditions of the Statewide Programmatic Biological Opinion of 22 August 2011 from the U.S. Fish and Wildlife Service on beach placement and shore protection in Florida (http://www.fws.gov/northflorida/BOs/20110822_bo_USFWS_Statewide_Programmatic_BO_Beach_Nourish_signed.pdf) and would follow The proposed action would follow the terms and conditions of the South Atlantic Regional Biological Opinion from the National Marine Fisheries Service http://el.erdc.usace.army.mil/seaturtles/refs-bo.cfm for use of a hopper dredge. With respect to blasting, (1) measures would be taken to minimize the impact of blasting on the environment and (2) monitoring would be used to minimize blasting in proximity of a sea turtle, right whales, and manatees.

Standard Manatee protection measures would be followed. No dredging would occur in an "Important Manatee Area" http://www.saj.usace.army.mil/Divisions/Regulatory/sourcebook.htm. With respect to blasting, the same measures and monitoring for other marine mammals would be used.

The proposed action may affect Right Whales. Right whales have been recently observed in the first three miles of the federal channel. The transit of dredged material to the Ocean Dredged Material Disposal Site would pass through designated critical habitat for wintering and calving Right Whales. The proposed action would follow the terms and conditions of the South Atlantic Regional Biological Opinion from the National Marine Fisheries Service (NMFS) http://el.erdc.usace.army.mil/seaturtles/refs-bo.cfm . To minimize impacts with right whales during transit and while using the ODMDS, vessels will adhere to all appropriate rules of and guidelines for vessel operation associated with the area including:

- The Right Whale Mandatory Ship Reporting System
- Guidance from the NMFS on Collision Avoidance (http://www.nmfs.noaa.gov/pr/pdfs/shipstrike/marinersweatherlog_shipstrike.pdf
- Maintaining Appropriate Speed within Mandatory Speed Restriction areas November 145 – April 15 (http://www.nmfs.noaa.gov/pr/pdfs/shipstrike/marinersweatherlog_shipstrike.pdf)

With respect to blasting, an Incidental Harassment Authorization would be obtained from NMFS for marine mammals including whales and dolphins. The monitoring and blasting plan would be similar to that defined for blasting in Miami Harbor www.nmfs.noaa.gov/pr/pdfs/permits/acoe_miamiharbor_iha_application.pdf .

Inspection of the CDF sites and removal of any gopher tortoises to acceptable, undisturbed locations before CDF use would avoid impacts to this species.

8.0 PROPOSED DISPOSAL SITE DETERMINATIONS

8.1.2 Summary

The proposed project construction is not expected to result in adverse impacts or cumulative adverse impacts. Avoidance of potential impacts and mitigation of

unavoidable impacts will be incorporated into construction plans and form part of the permit requirements for the project

The proposed disposal site locations continue activities that the USACE has conducted for many years without significant environmental impact. Development of a new ODMDS site is necessary to account for the additional volume of material generated during construction and that expected to be produced during 50 additional years of channel maintenance. A DEIS for the ODMDS now in review, consider the full range of potential disposal alternatives and recommend the site included in this DSEIS. The ODMDS DEIS concluded that (p246):“

> The designation of a new ODMDS offshore of Jacksonville is not expected to result in adverse cumulative impacts although short-term, temporary impacts may occur such as topographic change, changes in sediment composition, burial of organisms in the disposal area, changes in the benthic community, and potential changes to the local food web. Such temporary changes have been ongoing at existing sites for decades. The evaluation conducted in this EIS did not, however, find evidence that any of these changes has resulted in significant unacceptable adverse impacts to the region’s resources. …short-term temporary impacts may be minimized or mitigated through management methods. If significant effects are documented at the site during monitoring, actions will be taken to address those impacts.

The ongoing use of existing sites also discussed above has similarly not resulted in adverse impacts or cumulative adverse impacts. The dredging, handling, and disposal of material similar to that already being processed as part of previous deepening efforts and ongoing maintenance efforts without adverse impact indicates the likely path of the proposed project.

8.2 Determination of Compliance with Applicable Water Quality Standards

Water quality certifications are being requested from the State of Florida for the proposed deepening project as part of the SEIS. The environmental effects evaluation for the proposed dredged material indicated that the project will meet applicable WQS for all contaminants of concern at the edge of the mixing zone set up for dredging and disposal activities.

8.3 Stormwater Runoff Determinations

The proposed action will not impact any of the dredge disposal areas in any manner that would require a change in existing stormwater management or stormwater regulatory framework.

8.4 Potential Effects of Human Use Characteristic

8.5 Recreational and Commercial Fisheries

The transit routes to the ODMDS sites and dredged material disposal activities are expected to only minimally affect pelagic species. The combined activities areas (transport paths and ODMDS locations) are small with respect to the habitat area for inhabitant fishes. Fishes may avoid the area where ships are operating. Adult fishes within and immediately adjacent to the disposal area may experience a short-term reduction in dissolved oxygen uptake through the gills due to the presence of suspended particles clogging opercular cavities and gill filaments (Doudoroff 1957), as well as a slight decrease in available oxygen due to the biological oxygen demand of the dredged material. Adult fishes may also experience stress from avoidance reactions (USEPA 1995a). However, conditions which could impact pelagic fishes are expected to be short-term (hours) and localized (less than a mile), and the effects on pelagic adults in the water column are not expected to be significant.

Juveniles may be more susceptible to the effects of released dredged material (USEPA 1995a). Juveniles passing through a turbidity plume may be subject to interference with oxygen exchange through the gill membrane and slightly lowered oxygen availability due to the biological oxygen demand of the suspended sediments. The presence of juvenile fishes within the affected area would be minimal relative to their distribution along the coast.

8.6 Water Related Recreation and Aesthetics

The project will result in only temporary impacts to water quality, primarily as a result of turbidity generated during dredging and sediment disposal, whether at the proposed ODMDS, on a beach or nearshore area, or in an upland DMMA. While viewing a plume from dredging or dredged material disposal may temporarily decrease the aesthetic experience of that view, these effects are temporary. Ongoing maintenance creates similar conditions, so while the construction will occur more intensely than maintenance dredging at various locations, the effects will again be temporary and end with the completion of construction.

8.7 Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves

The Timucuan Ecological and Historic Preserve lies along the first several miles of the river. Coordination between USACE and federal natural resource agencies is underway to develop appropriate operation and monitoring plans for this area in light of the Preserve lands lying on both sides of the channel near the mouth of the river. No major or permanent adverse impacts to water quality are expected to the park or the area as a result of the project. Dredge material disposal will not occur in the Timucuan Preserve accept potentially as part of a beneficial use. At this time, the USACE has not identified any such uses. However, should such potential use be identified, all concepts and plans will be fully coordinated with and approved by the natural resource agencies responsible for the park and adjacent waters.

8.8 Determination of Cumulative Effects on the Aquatic Ecosystem

The disposal of and potential beneficial fill uses of dredged material will incur only minor cumulative effects on the aquatic / marine ecosystem into which the fill is placed, or into which discharge from CDFs flows.

While ongoing use of the ODMDS will bury existing benthic infauna, recolonization is expected to occur rapidly and represent a minor impact to the infaunal community and those species that feed on the in faunal community. This process of burial and recolonization will continue, as the much larger surrounding and undisturbed benthic habitat will continue to serve as a colonization source. Due to repeated disposal events, the elevation of the ODMDS sites will increase over time to the maximum elevation allowed by permit. This elevation will allow safe passage of vessels and not harass, hinder, or otherwise impact listed species that use the ODMDS water column and benthic resources.

8.9 Determination of Secondary Effects on the Aquatic Ecosystem

Secondary effects on the aquatic system may include some general wildlife avoidance of the project area over time because of dredging-produced turbidity and noise during disposal activities that will occur of the next 50 years. A small ongoing risk of vessel strikes during dredging and dredge disposal and otherwise may continue to occur during and after project construction if the project construction results in additional ship calls to the Jacksonville Harbor. The USACE NED analysis has indicated that fewer ships (albeit larger in size) may call on the port after project construction, so a smaller risk of vessel strikes to listed and managed species may also be a secondary effect of the project.

9.0 FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

9.1 Determinations

(a) An ecological evaluation of discharges of dredged material associated with the proposed deepening of the Lower St. Johns River between river mile 0 and river mile 13 has been made following the evaluation guidance in 40 CFR 230.6, in conjunction with the evaluation considerations in 40 CFR 230.5. The evaluation concluded that the proposed project is in full compliance with Section 404(b)(1) of CWA. Applicable State WQS will be met for CDF effluent discharges at the edge of the proposed mixing zones. The least environmentally damaging practicable alternatives were chosen to meet the project goals and objectives.

(b) The work will be conducted in accordance with state Water Quality Certifications to the extent practicable. Should it become apparent that operation of the project is resulting in a violation of state Water Quality Standards, coordination with the appropriate state will be initiated to determine the appropriate course of action. The disposal operation will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

(c) Operation of the project will not jeopardize the continued existence of any federally listed threatened or endangered species or its designated critical habitat. The Project will follow the provisions which the USFWS and NMFS state, through the Section 7 consultation process, as necessary.

(d) The project will be operated in accordance with the Marine Protection, Research, and Sanctuaries Act of 1972.

(e) The proposed discharges will not result in significant degradation of the Waters of the United States. There will be no significant adverse effects on human health and welfare, municipal and private water supplies, recreation and commercial fisheries, plankton, fish, shellfish, wildlife, special aquatic sites, life stages of aquatic life and other wildlife dependent on aquatic ecosystems, aquatic ecosystem diversity, productivity and stability, or recreational, aesthetic and economic values.

(f) The discharges will include all practicable and appropriate measures to minimize potential harm to the aquatic ecosystem, including mitigation for possible wetland losses as a result of the project.

9.2 Findings

Based on the determinations made in this Section 404(b)(1) Evaluation, the finding is made that with the conditions enumerated in both the BA for this project and the proposed dredged material environmental effects evaluation, the proposed discharges comply with the Section 404(b)(1) guidelines.

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